

IN THE CLAIMS

What is claimed is:

- 1 **1.** A method of forming contact holes, comprising the steps of:
 - 2 forming a first insulating film;
 - 3 forming a hole through the first insulating film;
 - 4 depositing a titanium layer in an essentially anisotropic manner;
 - 5 forming a titanium nitride film;
 - 6 forming a tungsten film;
 - 7 etching a tungsten film; and
 - 8 etching the titanium and tungsten films.
- 1 **2.** The method of claim 1, wherein:
 - 2 depositing a titanium layer in an essentially anisotropic manner
 - 3 includes depositing titanium according to method selected from the group
 - 4 consisting of an ion metal plasma method, a collimate sputtering method, and
 - 5 a long throw sputtering method.
- 1 **3.** The method of claim 1, wherein:
 - 2 forming a contact hole includes forming a contact hole having a width
 - 3 no greater than 0.25 μm .

- 1 **4.** A method, comprising the steps of:
2 anisotropically depositing a first conductive layer over a first
3 insulating layer having a contact structure hole formed therein; and
4 forming a conductive filling layer over the first conductive layer,
5 including within the contact structure hole.

- 1 **5.** The method of claim 4, wherein:
2 depositing the first conductive layer includes an ion metal plasma
3 physical deposition method.

- 1 **6.** The method of claim 5, wherein:
2 the ion metal plasma method of deposition includes applying an RF
3 power in the range of about 2.0 to 3.5 kilowatts to a chamber coil.

- 1 **7.** The method of claim 5, wherein:
2 the ion metal plasma method of deposition includes applying a DC
3 power in the range of 2.0 to 3.0 kilowatts to a target that includes a first
4 conductive layer material.

- 1 **8.** The method of claim 4, wherein:
2 depositing a first conductive layer includes a collimate sputtering
3 method.

1 **9.** The method of claim 8, wherein:

2 the collimate sputtering method includes moving sputtering particles
3 through a collimator having an aspect ration of about 2.

1 **10.** The method of claim 8, wherein:

2 the collimate sputtering method includes applying a DC power in the
3 range of 1.0 to 2.0 kilowatts to a target that includes a first conductive layer
4 material.

1 **11.** The method of claim 4, wherein:

2 depositing a first conductive layer includes a long throw sputtering
3 method.

1 **12.** The method of claim 11, wherein:

2 the long throw sputtering method includes sputtering in sputtering
3 chamber at a pressure no more than 1.0 mTorr.

1 **13.** The method of claim 4, wherein:

2 the first conductive layer comprises titanium.

1 **14.** The method of claim 4, wherein:

2 forming the conductive filling layer includes depositing tungsten with
3 a chemical vapor deposition method.

1 **15.** The method of claim 4, further including:
2 etching the conductive filling layer to expose the first conductive
3 layer.

1 **16.** The method of claim 15, further including:
2 etching the first conductive layer to expose the first insulating layer
3 and forming a plug from the conductive filling layer.

1 **17.** A method of forming a contact structure, comprising the steps of:
2 forming a first conducting layer over an insulating layer having a
3 contact hole formed therein, the first conducting layer having a first thickness
4 outside the contact hole that is greater than a second thickness on side surfaces
5 of the contact hole; and
6 forming a conducting filling layer over the first conducting layer
7 including within the contact hole.

1 **18.** The method of claim 17, wherein:
2 the first conducting layer comprises titanium and the first thickness is
3 at least 100 nm.

1 **19.** The method of claim 17, further including:
2 forming a second conducting layer over the first conducting layer prior

3 to forming the conducting filling layer.

1 20. The method of claim 17, further including:

2 etching the conducting filling layer with an etch having a selectivity
3 between the conducting filling layer and the first conducting layer; and

4 etching the first conducting layer with an etch having a selectivity
5 between the first conducting layer and the conducting filling layer.

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